Read the passages and answer the questions that follow.

The work performed by a spring is one of the classic examples of work performed by variable force. When a spring is neither compressed nor extended, we may say that it is in a relaxed state. Any time the spring is taken out of this state, whether by begin stretched or compressed, it will exert what is called a restoring force, as it attempts to reclaim its relaxed state. In most cases, we can say that the force (F) exerted by the spring is proportional to the displacement of the free end from its position during the relaxed state. This is known as Hooke's law, and is expresse**D:**

F = -kd

The negative sign in this equation indicates that the force is always opposite to the displacement. The constant k is known as the spring constant, and is a measure of the resilience of the spring.

45. What is one of the classic examples of work performed by variable force?

**A:** a ball rolling downhill

**B:** stretching out a spring

**C:** compressing a spring

**D:** the work performed by a spring

46. When is a spring in a relaxed state?

**A:** when it is neither collapsed nor extended

**B:** when it is compressed

**C:** springs are never in a relaxed state

**D:** when it is extended

47. Which is the best description of a spring's behavior when it is taken out of its natural state?

**A:** It conforms to its new position.

**B:** It attempts to return to its natural state.

**C:** It extends further in the direction that it has been moved.

**D:** It breaks in half.

48. If a spring is stretched 8 cm from its relaxed position, and then moved another 5 cm away from that position, what will happen to its restoring force?

**A:** It will become smaller.

**B:** It does not have a restoring force.

**C:** It will become larger.

**D:** It will stay the same.

49. Why is the spring constant always negative?

**A:** Because it always acts in the opposite direction as the force acting on the spring

**B:** Because it always acts in the same direction as the force acting on the spring.

**C:** Because it always acts perpendicular to the force acting on the spring.

**D:** Because it goes toward the center of the earth.

Answer Key

1. D. The restoring force of a spring is a great example of variable force.

2. A. The rest state of a spring, neither collapsed nor extended, is its relaxed state.

3. B. Springs will always tend to return to their relaxed position.

4. C. The farther away the spring is moved from its relaxed position, the greater will become the restoring force.

5. A. The restoring force always resists the force that moves the spring out of its relaxed position.